BIOLOGY

BOOKS - MBD

PRINCIPLES OF INHERITANCE & VARIATION

Example

1. What is clone?

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2. How cloning can prove useful to plant breeders?

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3. How allele is different from allelomorphs?

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4. Define heredity.

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5. Somatic variations affect which type of cells.

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6. Coin one word for a class of individuals which are morphologically similar

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7. Coin one word or two word equivalents for the following:

A cross between parents differing in one pair of contrasting characters.

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8. Coin one word or two word equivalents for the following:

A cross of dihybrid with a homozygous recessive individuals.

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9. Coin the term for the character which does not allow the expression of contrasting character in a hybrid?

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10. Coin one word or two word equivalents for the following:

The factors controlling the characters.

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11. Coin one word or two word equivalents for the following:

An individual which does not breed true for two characters.

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12. Coin one word or two word equivalents for the following:

A pair of genes controlling a pair of contrasting characters.

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13. Coin the term for individual which breed true for its character.

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14. Give the name of the person and his experimental specimen who carried out the

qualitative inheritance for the first time.

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15. On which plant did Mendel work?

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16. What is the drawback in breeding and cloning?

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17. What is gene pool?

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18. Name one trait that does not blend.

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19. Why did mendel choose garden pea for his experiments?

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20. What is true-breeding line?

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21. How many true breeding varieties of garden pea plant did Mendel select for starting his experiments?

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22. What are Mendelian Factors?

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23. What are Mendelian factors called these days?

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24. What types of allele produces its effects only in homozygous individuals?

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25. Give the scientific name of any one plant that exhibits incomplete dominance in the inheritance of its flower colour.

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26. What is the phenotypic and genotypic ratio of incomplete dominance?

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27. Define multiple allelism.

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28. Which of the following is an example of condominance?

A. Pink flowers of snapdragon

B. The ABO blood groups in humans

C. Sex-linkage in humans

D. Skin pigmentation in humans

Answer:

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29. What are possible genotypes for blood group B.

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30. Define pleiotropism.

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31. Who has proposed the chromosomal theory of inheritance ?

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32. Write the scientific name of the organism that Morgan used for his experiments.

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33. The number of chromosomes is specific to a species. Give the number of chromosomes in Drosophila melanogaster.

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34. In males, urethra carries :

A. a. sperm only

B. b. urine only

C. c. Both of these

D. d. None of these

Answer:

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35. What is meant by linkage?

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36. What is meant by linked genes?

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37. Improve upon the statement given below:'Linked genes are located on the same chromosome'.

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38. What is crossing over ?

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39. Who first observed the X-chromosome? What was it called then?

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40. Why is the X-chromosome called sex chromosome?

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41. Which chromosomes are called autosomes?

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42. Define heterogamety.

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43. Why is Drosophila male fly referred to as heterogametic?

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44. The egg of an animal contains 10 chromosomes, of which one is X-chromosome. How many autosomes would there be in the karyotype of this animal?

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45. Name two organisms where males are heterogametic.

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46. Give one example where males are XO.

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47. Do you think the number of chromosomes in males and females of grasshopper are equal.

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48. Name an example of organsim, where females are heterogametic.

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49. How is female heterogamety represented?

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50. Define mutation.

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51. How many pairs of chromosomes does a male Drosophila fly have? Which one of these bears the gene for eye colour?

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52. Describe in detail chromosomal mutations.

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53. What are Point Mutations ? Give one example of Point Mutations.

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54. What causes frameshift mutations?

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55. What is a mutagen? Give an example.

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56. What is meant by aneuploidy?

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57. In which two ways numberical change occurs in chromosome?

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58. How are mutations caused?

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59. Name three kinds of mutagens.

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60. Name two Mendelian disorders.

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61. Name the disorder with the followlwing chromosome complement.

22 pairs of autosomes + XXY

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62. Name the disorder with the followlwing chromosome complement.

22 pairs of autosomes + 21st chromosome + XY.

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63. A human zygote has XXY sex chromosome and 22 pairs of autosome. What sex will the individual be?

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64. What is the sex and the condition of sex chromosomes in an individual with Klinefelter's syndrome?

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65. Name two disorders in human beings that arises due to aneuploidy.

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66. What is karyotype of Turner's syndrome.

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67. Name one sex linked recessive disease.

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68. The part where fertilization ovum takes place in human is :

A. a.ovary

B. b. uterus

C. c. vagina

D. d. fallopian tube

Answer:

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69. Differentiate between the following:

Dominance and recessiveness

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70. Differentiate between homozygous and heterozygous individuals.

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71. Differentiate between the following:

Monohybrid and dihybrid.

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72. A diploid organism is heterozygous for 4 loci, how many types of gametes can be produced?

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73. Explain the law of dominance using a monohybrid cross.

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74. Define and design a test cross.

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75. Using a Punnett Square, workout the distribution of phenotypic features in the first

filial generation after a cross between a homozygous female and a heterozygous male for a single locus.

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76. When a cross In made between tall plant with yellow' seeds (TtYy) and tall plant with green seed (Ttyy), what proportions of phenotype In the offspring could be expected to be: tall and green

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77. Two heterozygous parents are crossed. If the two loci are linked what would be the distribution of phenotypic features in F_1 generation for a dihybrid cross?

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78. Briefly mention the contribution of T.H. Morgan in genetics.

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79. What is pedigree analysis? Suggest how such an analysis, can be useful.

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80. How Is sex determined in human beings?

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81. A child has blood group O. If the father has blood group A and mother blood group B,

work out the genotypes of the parents and the possible genotypes of the other offsprings.

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82. Explain the following terms with example: Co-dominace

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83. Explain the following terms with example:

Incomplete dominance

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84. What are Point Mutations ? Give one example of Point Mutations.

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85. Who had proposed the chromosomal theory of the inheritance?

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86. Mention any two autosomal genetic disorders with their symptoms.

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87. What is Down's syndrome? Give its symptoms and cause. Why is it that the chances of having a child with Down's syndrome increases if the age of the mother exceeds forty years?

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88. What is the cross between the progeny of F_1 and homozygous recessive parent called? How is it useful?

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89. Do you think Mendel's laws of inheritance would have been different if the characters that he choose were located on the same chromosome?

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90. Enlist the steps of controlled cross pollination. Would emasculation be needed in a cucurbit plant? Give reason for your answer.

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91. A person has to perform crosses for the purpose of studying inheritance of a few traits/characters.What would be the criteria for selecting the organisms?

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92. what is protogynous condition? give one example

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93. In order to obtain the F_1 generation, Mendel pollianted a pure breeding tall plant with a pure breeding dwarf plant. But for getting the F_1 generation, he simply self pollinated the tall F_1 plants. Why?

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94. "Genes contain the information that is required to express a particular trait". Explain.

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95. How are alleles of particular gene different? Explain its significance.

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96. In monohybrid cross of red and white flower, Mendel got only red flower. On setting the F_1 plants having red flower he got both plants with red and white flower. Explain the

basis of using RR and rr symbols to represent the genotype of plants of parental generation.

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97. For the expression of traits, genes provide only the potentially and the environment provides the opportunity. Comment on the veracity of the statement.

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98. A, B, D are three independently assorting genes with their recessive alleles a, b, d respectivley. A cross was made ebtween individual of AabbDD genotype with aa bbdd. Find out the type of genotypes of the offspring produced.

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99. In our society a woman is often blamed for not bearing mate child. Do you think it is right

? Justify.

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100. Discuss the genetic basis of wrinkled phonotype of Pea seed.

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101. Even if a character shows multiple allelism, an individual will have only two alleles for that character. Why ?

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102. How does a mutagen induce mutation? Explain with example.

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103. In a Mendelian monohybrid cross, the F_2 generation shows identical genotypic and phenotypic ratios. What does it tell us about

the nature of alleles involved. Justify your answer.

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104. What is Down's syndrome? Give its symptoms and cause. Why is it that the chances of having a child with Down's syndrome increases if the age of the mother exceeds forty years?

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105. Can a child have blood group 'O' if his parents have blood group 'A' and 'B'. Explain.

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106. How was it concluded that genes are located on chromosomes?

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107. A plant with red flowers was crossed with another plant with yellow flowers. If F_1 showed all flowers orange in colour, explain the inheritance.

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108. What are the characteristic features of a true breeding line?

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109. In peas, tallness is dominant over dwarfness and red colour of flowers is dominant over the white colour. When a tall platn bearing red flowers was pollinated with dwarf plant bearing white flowers, the different phenotypic groups were obtained in the progeny in number (a)Tall, red - 138 (b)Tall, white - 132 (c)Dwarf, red - 136 and (d)Dwarf, white - 128. Mention the genotypes of the two parents and of the four offspring types.

110. Why is the frequency of red green colour blindness is many times higher in males than in the females?

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111. If a father and son are both defective in red-green colour vision, is it likely that the son inherited the trait from his father? Comment.

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112. Why Drosphila has been used extensivley for genetical studies?

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113. How do genes and chromosomes share similarity from the point of view of genetical studies.

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114. What is recombination? Discuss the applications of recombination from the point of view of genetic engineering.

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115. Differentiate btween incomplete dominance and co-dominance. Substantiate your answer with one example of each.

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116. It is said, that the harmful alleles get eliminated from population over a period of time, yet sickel cell anaemia is persisting in human population. Why?

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117. In a plant tallness is dominat over dwarfness and red flower is dominant over white. Starting with the parents out a dihybrid cross. What is standard dihybrid ratio? Do you think the values would deviate if the two

genes in question are interacting with each other?

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118. In human, males are heterogametic and females are homogametic, Explain. Are there any examples where males are homogametic and feamles heterogametic?

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119. Also describe as to, who determines the sex of an unborn child?

Mention whether temperature has a role in sex determination.

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120. A normal visioned woman, whose father is colour blind, marries a normal visioned man. What would be probability of her sons and

daughters to be colour blind? Explain with the help of a pedigree chart.

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121. Define aneuploidy. How is it different from polyploidy? Describe the individuals having following chromosomal abnormalities.

Trisomy of 21st Chromosome

XXY

X0.

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122. Give one example of genetic trait for each of the following in humans:

Lethality

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123. Give one example of genetic trait for each of the following in humans:

Multiple allelism

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124. How will you find out whether a given plant is homozygous dominant or heterozygous dominant?

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125. Give the scientific name of any one plant that exhibits incomplete dominance in the inheritance of its flower colour.

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126. Mention the phenomenon of pleiotropy by giving an example.

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127. Who were the rediscovrers of Mendelism?

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128. Which one of the honeybee is monoploid and which one is diploid?

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129. Why is Drosophila male fly referred to as heterogametic?

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130. a geneticist interested in study variations and pattern in living being, prefer to chose organism with short life cycle. Provide a reason.

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131. Give an example of human disorder that is caused due to a single gene mutation.

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132. British scientist R.C. Punnett developed a graphical representation of a genetic cross called Punnett Square. Mention the possible result this representation predicts of the genetic cross.

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133. Differentiate clone and offsprings.

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134. What are the causes of variations in clones? Are identical twines clones of each other?

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135. Explain the term variation?

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136. How did Mendel make sure that the plants were true breeding?

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137. Make a table showing characters of pea selected by mendel.

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138. How can the pea plant be prevented from self pollination? How is cross pollination carried out?

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139. What is monohybrid cross?

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140. Mendel published his work on inheritance of characters in 1865, but it remained unrecognized till 1900. Give three reasons for the delay in accepting his work.

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141. Mendel observed two kinds of ratios 3:1 and 1:2:1 in F_2 generation in his experiments on garden pea. Name these two kind of ratios respectively.

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142. The F_2 plants are selfer. The white flowered plants produced only white flowered F_3. Some of the purple flowered F_2 produced only purple flowered F_3 while others produced bothe white and purple flowered F_3 plants. Provide the genetic basis for the observation.

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143. What is a dihybrid cross?

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144. Why is mendel known as father of genetics?

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145. Differentiate between Back Cross andTest Cross.

Watch Video Solution

146. Differentiate between Back Cross andTest Cross.

Watch Video Solution

147. Differentiate Phenotype and Genotype.

Watch Video Solution

148. What is gene interaction?

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149. What do you understand by codominant alleles?

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150. Describe the mechanism of patter of inheritance of ABO blood groups in human.

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151. What will be the blood groups of following genotypes?

$I^A I^B$

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152. What will be the blood groups of following genotypes?

$I^A I^O$

Watch Video Solution

153. What will be the blood groups of following genotypes?

$I^O I^O$

Watch Video Solution

154. What will be the blood groups of following genotypes?

$I^B I^B$

Watch Video Solution

155. What will be the blood groups of following genotypes?

$I^B I^O$

Watch Video Solution

156. What will be the blood groups of the children of following matings?

$I^A I^B \times I^B I^B$

Watch Video Solution

157. What will be the blood groups of the children of following matings?

$I^A I^O \times I^A I^B$

Watch Video Solution

158. What will be the blood groups of the children of following matings?

$I^A I^B \times I^A I^B$

Watch Video Solution

159. What will be the blood groups of the children of following matings?

$I^O I^O \times I^A I^B$

Watch Video Solution

160. How many genes are responsible for?

ABO system of blood group.

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161. How many genes are responsible for?

Skin colour in human.

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162. What is the term for the ability of a gene to have many effects? Give one example from human genetics.

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163. Sometimes a gene which carries a major disadvantage in a homozygous conditions, confers an advantage in heterozygous condition. Explain with a suitable condition.

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164. With a suitable example, explain pleiotropy. Which of the genes studied by Mendel in pea is now considered to be pleiotropic?

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165. What is Pleitropy? Give one example.

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166. How is polygenic inheritance different from pleiotropy? Give one example of each.

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167. Who has proposed the chromosomal theory of inheritance ?

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168. It is not possible to study the inheritance of traits in humans in the same way as in pea. Give two reasons. Name the alternative method employed for the same.

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169. Correlate between behaviour of genes and chromosomes during meiosis in higher organisms.

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170. List the main points of chromosome theory of inheritance.

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171. List the functions of chromosomes.

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172. What is karyotyping? Who studied human karyotype for the first time? Define idiogram.

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173. What is the importance of Karyotype?

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174. Describe bacterial (prokaryotic) chromosome.

Watch Video Solution

175. What are plasmids?

Watch Video Solution

176. List the characteristics of plasmids.

Watch Video Solution

177. Give four difference between a prokaryotic chromosome and a eukaryotic chromosome.

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178. The male fruit fly and female fowl are heterogametic while the female fruit fly and the male fowl are homogametic. Why are they called so?

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179. What are the sexual functions of X and Y chromosomes in Drosophila and man?

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180. How does gain or loss of chromosome (s) take place in humans? Describe one example each of chromosomal disorder along with the symptoms involving an autosome and a sex chromosome.

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181. List a few abnormalities linked with number of sex chromosomes. Write features of anyone also.

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182. List the mechanisms responsible for generating variability in a population.

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183. Briefly explain XX-XO type of sex determination.

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184. Explain the mechanism of sex determination in birds. How does it differ from that of human beings?

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185. Write a note on ZO-ZZ type of sex determination.

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186. Linkage and crossing over of genes are alternatives of each other. Justify.

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187. What is Linkage ? Describe its types. Give four factors affecting Linkage.

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188. Write a note on incomplete linkage.

Watch Video Solution

189. Differentiate between:

Crossing over and cross over gametes.

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190. Briefly explain Linkage Groups.

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191. What is Morgan's concept of linkage? List the salient features of linkage.

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192. Write a note on incomplete linkage.

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193. What is sex linkage?

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194. During his studies on genes in Drosophila that were sex-linked T.H. Morgan found f_2 population phenotypic ratios deviated from expected 9:3:3:1. Explain the conclusion he arrived at.

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195. Why is a man unable to pass on a sex linked gene to his son?

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196. What is crossing over ?

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197. What do you understand by the term recombination?

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198. Show the formation of recombinant and parental type gametes.

Watch Video Solution

199. Define crossing over. What is the significance of crossing over ?

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200. What are mutations ?

Watch Video Solution

201. Illustrate the type of mutation that can arise by change in chromosome structure.

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202. Explain in detail about the types of gene mutations.

Watch Video Solution

203. What is aneuploidy? Give an example.

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204. Differentiate trisomic condition and triploid condition.

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205. Write a note on mutagens.

Watch Video Solution

206. What are Barr bodies? Discuss its significance.

Watch Video Solution

207. Define protandry and give one example.

Watch Video Solution

208. How does a chromosomal disorder differ from a Mendelian disorder?

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209. Name any two chromosomal aberration associated disorders.

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210. Name two animals which can regenrate their lost parts.

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211. Write a note on cystic fibrosis.

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212. What is the cause of phenylketonuria? Write symptoms.

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213. A colour blind child is born to a normal couple. Work out a cross to show how is it possible. Mention the sex of this child.

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214. Differentiate male and female heterogamety.

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215. Give an example fo an autosomal recessive trait in humans. Explain its pattern of inheritance with the help of a cross.

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216. How would you find genotype of a tall pea plant bearing white flowers? Explain with the help of a cross. Name the type of cross you would use.

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217. Why are human beings called unisexual organisms ?

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218. In which type of reproduction 1. gametes are involved; 2. gametes are not involved.

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219. A true breeding tall plant is crossed with a true breeding dwarf plant. F_1 progeny is 100% tall and F_2 has tall: dwarf in the ratio 3:1

Name the patterns fo inheritance in which the ratio deviates from above. Also mention the deviated phenotypic ratio.

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220. You are given a red flower bearing flower plant and a red flower bearing snapdragon plant. How would you find the genotypes of these two plants with respect to colour of flower?

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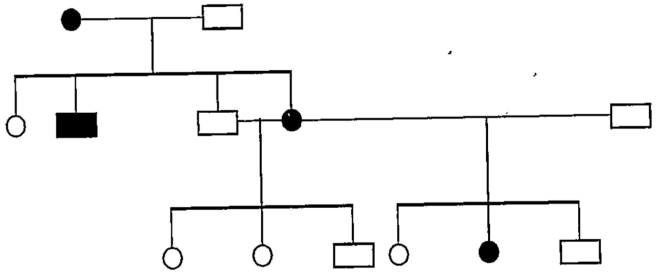
221. In the following pedigree chart, state if the trait is autosomal dominant, autosomal

recessive or sex linked. Give a reason for your answer.



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222. Describe two methods by which Paternal genes form new combination?

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223. Name the male part of flower.

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224. Why is human ABO blood group gene considered a good example of multiple alleles?

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225. Work out a cross up to F_1 generation only, between a mother with blood group A

(Homozygous) and father with blood group B (Homozygous). Explain the pattern of inheritance exhibited.

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226. Name the female part of flower.

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227. Explain monohybrid cross

Watch Video Solution

228. Explain Mendel's law of segregation with the help of a monohybrid cross.

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229. State and explain the law of independent assortment with a dihybrid cross.

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230. A cross between a red flower bearing plant and a white flower bearing plant of Antirrhinum majus produced all plants having pink flowers. Work out a cross to explain how is this possible?

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231. List various conclusions drawn from a cross between red flowering plant and white

flowering plant which give same genotypic and phenotypic ratios of 1:2:1 in F_2 generation.

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232. What is linkage? Indicate its relationship with independent assortment.

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233. Define zygote.

Watch Video Solution

234. Sporopollenin is present in :

A. a. Exine

B. b. Intine

C. c. Both

D. d. None of these

Answer:

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235. Name two basic processes of sexual reproduction.

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236. Why are human females rarely haemophilic? Explain, how do haemophilic patients suffer?

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237. A child suffering from Thalassemia is born to a normal couple. But the mother is being blamed by the family for delivering a sick baby. What is Thalassemia?

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238. A child suffering from Thalassemia is born to a normal couple. But the mother is being blamed by the family for delivering a sick baby. How would you counsel the family not to

blame the mother for delivering a child suffering from this disease? Explain.

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239. A child suffering from Thalassemia is born to a normal couple. But the mother is being blamed by the family for delivering a sick baby. List the values your counselling can propagate in the families.

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240. What is polygenic inheritance? Explain with the help of a suitable example.

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241. How are pleiotropy and Mendelian pattern of inheritance different from polygenic pattern of inheritance?

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242. A progeny of F_1, is crossed with the homozygous recessive parent, What is this cross called? Work out how is it useful?

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243. In order to obtain the F_1 generation, Mendel pollianted a pure breeding tall plant with a pure breeding dwarf plant. But for getting the F_1 generation, he simply self pollinated the tall F_1 plants. Why?

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244. Two genes 'A' and 'B' are linked. In a dihybrid cross involving these two genes, the F_1 heterozygote is crossed with homozygous recessive parental type (aa bb). What would be the ratio of offspring in the next generation?

A. $1:1:1:1$

B. $9:3:3:1$

C. $3:1$

D. $1:1$

Answer:

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245. In the F_2 generation of a Mendelian dihybrid cross the number of phenotypes and genotypes are:

A. phenotypes - 4 , genotypes - 16

B. phenotypes - 9 , genotypes - 4

C. phenotypes - 4 , genotypes - 8

D. phenotypes - 4 , genotypes - 9

Answer:

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246. Write the dominant characters in case of pea studied by Mendel.

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247. a geneticist interested in study variations and pattern in living being, prefer to chose

organism with short life cycle. Provide a reason.

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248. Write the sequence of seven amino acid of Hb^S peptide chain of sickle cell anaemia.

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249. Explain the law of dominance using a monohybrid cross.

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250. Name autosomal dominant and one autosomal recessive Mendelian disorder in human?

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251. What are true breeding line's that are used to study inheritance pattern traits in plants

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252. What is point mutation? Explain with an example. List two mutagens.

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253. How Is sex determined in human beings?

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254. If a true breeding homozygous pea plant with green pod and axial flower as dominant characters is crossed with a recessive homozygous pea plant with yellow seeds and terminal flowers, then what would be the:

genotypes of the two parents

phenotypes and genotype of the F_1 offspring

phenotypic distribution ratio in F_2 population?

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255. You are given tall pea plants with yellow seeds whose genotypes are unknown. How would you find the genotype of these plants? Explain with the help of cross.

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256. What is pedigree analysis? Suggest how such an analysis, can be useful.

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Exercise

1. All genes located on the same chromosome:

A. Form different groups depending upon their relative distance

B. form one linkage group

C. Will not form any linkage groups

D. Form interactive groups that affect the phenotype

Answer:

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2. Conditions of a karyotype 2 n+1 and $2n \pm 2$ are called:

A. Aneuploidy

B. Polyploidy

C. Allopolyploidy

D. Monosomy

Answer:

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3. Distance between the genes and advantage of recombination shows:

A. a direct relationship

B. an inverse relationship

C. a parallel relationship

D. no relationship

Answer:

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4. If a genetic disease is transferred from a phenotypically normal but carrier female to only some of the male progeny, the disease is:

A. Autosomal dominant

B. Autosomal recessive

C. Sex-linked dominant

D. Sex-linked recessive

Answer:

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5. In sickel cell anaemia glutamic acid is replaced by valine. Which one of the following triples codes for valine?

A. G G G

B. A A G

C. G A A

D. G U G

Answer:

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6. Person having gentoype $I^A I^B$ would show the blood group as AB. This is because of:

A. Pleiotropy

B. Co-dominance

C. Segregation

D. Incomplete dominance

Answer:

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7. ZZ/ZW type fo sex determination is seen in:

A. Platypus

B. Snails

C. Cockroach

D. Peacock

Answer:

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8. Across between two tall plants resulted in offspring having few dwarf plants. What would be the genotypes of both the parents?

A. TT and Tt

B. Tt and Tt

C. TT and TT

D. Tt and tt

Answer:

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9. In a dihybrid cross, if you get 9:3:3:1 ratio it denotes that:

A. The alleles of two genes are interacting with each other

B. It is a multigenic inheritance

C. It is a case of multiple alleles m

D. The alleles of two genes are segregation independently.

Answer:

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10. Which of the following will not result in variations among siblings?

A. Independent assessment of genes

B. Crossing over

C. Linkage

D. Mutation

Answer:

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11. Mendel's law of independent assorment holds good for genes situated on the:

A. non-homologous chromosomes

B. homologours chromosomes

C. extra nuclear genetic element

D. same chromosome

Answer:

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12. Occasionally a single gene may express more than one effect. The phenomenon is called:

A. multiple allelism

B. mosaicism

C. pleiotropy

D. polygeny

Answer:

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13. In a certain taxon of insects some have 17 chromosomes and the others have 18 chromosomes. The 17 and 18 chromosome bearing organisms are:

A. males and females, respectively

B. females and males respectively

C. all males

D. all females

Answer:

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14. The inheritance pattern of a gene over generations among humans is studied by the pedigree analysis. Character studied in the pedigree analysis is equivalent to:

A. (a) quatitative trait

B. (b) mendelian trait

C. (c) polygenic trait

D. (d) maternal trait

Answer:

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15. It is said that Mendel proposed that the factor controlling any character is discrete and independent. This proposition was based on the:

A. results of F_3 generation of a cross.

B. obserevations that the offspring of a cross made between the plants having

two contrasting characters shows only one character without any blending.

C. self pollination of F_1 offsprings

D. cross pollination of parental generations

Answer:

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16. Mother and father of a person with O blood group have 'A' and 'B' blood group

respectively. What would be the genotype of both mother and father?

A. Mother is homozygous for 'A' blood group and father is heterozygous for 'B'.

B. Mother is heterozygous for 'A' blood group and father is homozygousmfor 'B'.

C. Both mother and father are heterozygous for 'A' and `B' blood group, respectively.

D. Both mother and father are homozygous for 'A' and 'B' blood group, respectively.

Answer: